

LISTING OF CLAIMS:

Claims 1 – 31 (cancelled).

32. (Cancelled)

33. (Currently Amended) A method of operating an assembly system to place labels on circuit boards assembled therein, comprising the steps of:

detecting that a label has been removed from a roller platform on a label feeder operatively associated with the assembly system;

in response to detecting that the label is removed for placement on a circuit board, initiating advancement of a tensioned label liner over a separation edge to cause a sequential label to be peeled from the label liner and pushed onto the roller platform adjacent to the separation edge;

detecting that the label is present on the roller platform; and

in response to detecting the presence of the label on the platform, stopping the advancement of the tensioned label liner; and

~~The method of claim 32, further comprising the step of retrieving, during a single assembly cycle, at least one component from another component feeder in the assembly system.~~

34. (Previously added) An assembly system, including:

means for presenting a circuit board to be populated with one or more components on a surface thereof;

a plurality of component feeders operatively associated with the assembly system, for presenting components at respective component pick-up locations;

a robot for retrieving the components from said component feeders at the respective pick-up locations and placing the components on the surface of the circuit board;

wherein at least one of said component feeders is a label feeder for feeding a label on a label liner to the respective pick-up location for retrieval by the robot, and where said label feeder comprises

a frame,

a separator presenting an edge underlying the label liner for separating the label from the label liner; and

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a roller platform including a plurality of rollers disposed on said frame for receiving and supporting the label, wherein at least two of said plurality of rollers include a plurality of circumferential ridges for supporting the label.

35. (Previously added) The assembly system of claim 34, wherein the label is an adhesive-backed label, where the roller platform includes rollers facing the adhesive backing side of the label for receiving and supporting the adhesive side thereof, and where the circumferential ridges support the adhesive-backed label while reducing the adhesion of the label to the rollers.

36. (Previously added) A method for assembling a printed circuit board in an assembly system, including the steps of:

presenting a substrate to be populated with one or more components on a surface thereof;

presenting, on a plurality of component feeders operatively associated with the surface mount assembly system, components for retrieval at respective component pick-up locations;

automatically retrieving the components from said component feeders at the respective pick-up locations and placing the components on the surface of the printed circuit board;

wherein at least one of said component feeders is a label feeder for feeding a label on a label liner to the respective pick-up location for retrieval by the robot, and where said label feeder executes steps comprising

separating the label from the label liner using a separator edge underlying the label liner; and

receiving and supporting the separated label on a roller platform including a plurality of rollers, wherein at least two of said plurality of rollers include a plurality of circumferential ridges for supporting the label.

37. (Previously added) A method for providing a peeled, adhesive-backed label from a roll of lined label stock using a path for conveyance of the stock within a pick-and-place machine suitable for placing surface mount components, in order to provide the label for placement onto a circuit board, comprising the steps of:

advancing the label stock along said web path using label stock drive means oriented to fit within a conventional surface mount component feeding device location ;

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separating the label from the label liner using a separating edge underlying the label liner;

receiving the label on a platform including a plurality of ridged rollers, where said platform is positioned so as to be compatible with conventional component feeding devices in the pick-and-place machine and wherein the adhesive-backed surface of the label contacts the ridges of the rollers;

using a sensor, sensing the presence and absence of a separated label on said platform and communicating said presence and absence to said drive means;

in response to a label absence signal from said sensor, energizing said drive means to advance the label stock around said separating means to separate a label from said stock; and

in response to a label presence signal from said sensor, de-energizing said drive means to arrest further advance of the label stock and signaling the de-energization of said drive means to the pick-and-place machine.

38. (Previously added) The method of claim 37, wherein the drive means includes a stepper motor operatively coupled to a pair of capstan rollers, and where the step of advancing the label stock comprises the step of energizing the stepper motor to rotate through incremental steps so as to cause the rotation of the capstan rollers that have the label liner engaged therebetween, until receiving a signal to stop driving the label liner in response to the label presence signal.

39. (Previously added) The method of claim 38, further comprising the step of crimping the label stock using meshing flutes on said pair of capstan rollers so as to positively drive the label liner through a roller nip between the pair of capstan rollers.

40. (Previously added) A method of operating a pick and place circuit board assembly system incorporating a programmable feeder to place labels on circuit boards during assembly, comprising the steps of:

acknowledging, in response to a sensor input, that a label has been removed from a roller platform on the programmable label feeder by a vacuum head of the pick and place circuit board assembly system;

initiating, in response to detecting that the label is removed, the advancement of a tensioned label liner over a separation edge to cause a subsequent label to be

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peeled from the label liner and pushed onto the roller platform located adjacent to the separation edge;

in response to detecting the presence of the subsequent label on the platform, stopping the advancement of the tensioned label liner; and

communicating to the pick and place circuit board assembly system the availability of the subsequent label.

41. (Previously added) The method of claim 40, further comprising the step of retrieving, during a single assembly cycle, at least one electrical component from a component feeder within the pick and place circuit board assembly machine.

42. (Previously added) The method of claim 41, wherein an adhesive-backed label is separated from a roll of lined label stock, further comprising the steps of:

advancing the label stock along said web path using label stock drive means oriented to fit within a conventional pick and place circuit board assembly system component feeder bay;

receiving the label on a platform including a plurality of circumferentially ridged rollers, where said platform is positioned so as to be compatible with conventional component feeding devices in the pick and place circuit board assembly system and wherein the adhesive-backed surface of the label contacts ridges of the circumferentially ridged rollers; and

in response to detecting the presence of the label on the platform signaling the availability of a label to the pick-and-place circuit board assembly system.

43. (Previously added) A pick and place assembly system, including:

means for presenting a circuit board to be populated with components on a surface thereof;

a plurality of component feeders operatively associated with the pick and place assembly for presenting components at respective component pick-up locations;

an automated pick and place head for retrieving the components from said component feeders at the respective pick-up locations and placing the components on the surface of the circuit board;

wherein at least one of said component feeders is a programmable label feeder for feeding a label on a label liner to the respective pick-up location for retrieval by the pick and place head, and where said label feeder comprises a frame,

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a programmable controller
a separator presenting an edge underlying the label liner for separating the label from the label liner; and
a roller platform including a plurality of rollers disposed on said frame for receiving and supporting the label, wherein at least two of said plurality of rollers include a plurality of circumferential ridges for supporting the label; and where said label liner and associated labels are advanced under the control of the programmable controller in response to communications between said programmable controller and the pick and place assembly system.

44. (Previously added) The pick and place assembly system of claim 43, wherein the label is an adhesive-backed label, where the roller platform includes rollers facing the adhesive backing side of the label for receiving and supporting the adhesive side thereof, and where the rollers have circumferential ridges to support the adhesive-backed label while reducing the adhesion of the label to the rollers.